

What is Claimed:

1 1. A braided modular stent comprising a first component and a second
2 component, each component comprising an hourglass-shaped interface, each hourglass
3 shaped interface comprising a reduced diameter section positioned between two sloped
4 sections, each sloped section extending between the reduced diameter section and one of a
5 plurality of nominal diameter sections, the reduced diameter section having a greater radial
6 strength than the nominal diameter sections.

1 2. The stent of claim 1, wherein reduced diameter section of the
2 hourglass-shaped interface has a greater braiding angle than the nominal diameter sections.

1 3. The stent of claim 1, wherein the reduced diameter section of the
2 hourglass-shaped interface comprises filaments having a first set of metallurgical properties
3 different than a second set of metallurgical properties in the nominal diameter sections.

1 4. The stent of claim 1, wherein the reduced diameter section of the
2 hourglass-shaped interface comprises a plurality of first regions of braided filaments in which
3 the filaments have a first cross-sectional area that is greater a second cross-sectional area in a
4 plurality of second regions of braided filaments in the nominal diameter sections.

1 5. The stent of claim 1, wherein the first component comprises a body
2 having at least one integral leg stump depending therefrom, each leg stump comprising an
3 hourglass-shaped interface, and the second component comprises a leg adapted to interface
4 with the leg stump.

1 6. The stent of claim 5 comprising two integral leg stumps and two legs,
2 each leg adapted to interface with one of the leg stumps.

1 7. The stent of claim 1, wherein at least one of the first component or the
2 second component has an end section having a wound architecture.

1 8. The stent of claim 7, wherein the wound architecture comprises a
2 hexagonal cell architecture.

1 9. The stent of claim 1, further comprising one or more circumferential
2 elevations, each elevation comprising a first section of the stent having a first diameter that is
3 greater than a second diameter of a second section of the stent distally adjacent the elevation
4 and a third diameter of a third section of the stent proximally adjacent the elevation.

1 10. The stent of claim 9, wherein the one or more circumferential
2 elevations is maintained by a plurality of filaments affixed between the second section and the
3 third section.

1 11. The stent of claim 10, wherein each filament connects a first overlap of
2 braided filaments in the first portion to a corresponding second overlap in the second portion.

1 12. The stent of claim 11, wherein the filament comprises a suture, a
2 staple, or a length of wire.

1 13. The stent of claim 1, wherein at least one of the first component or the
2 second component further comprises a sealing region for providing an endoleak-resistant seal
3 between the stent and a body lumen into which the stent is adapted to be installed.

1 14. The stent of claim 13, wherein the sealing region comprises a greater
2 radial strength than portions of the stent adjacent to the sealing region.

1 15. The stent of claim 14, wherein the sealing region has a first braiding
2 angle greater than a second braiding angle in the portions of the stent adjacent to the sealing
3 region.

1 16. The stent of claim 14, wherein the sealing region has a first set of
2 metallurgical properties different than a second set of metallurgical properties in the portions
3 of the stent adjacent to the sealing region.

1 17. The stent of claim 16, wherein the first set of metallurgical properties
2 are caused by a first annealing history and the second set of metallurgical properties are
3 caused by a second annealing history.

1 18. The stent of claim 14 comprising a plurality of braided filaments,
2 wherein the sealing region comprises first regions of the braided filaments in which the
3 filaments have a first cross-sectional area that is greater a second cross-sectional area in
4 second regions of the braided filaments in the portions of the stent adjacent to the sealing
5 region.

1 19. The stent of claim 14, wherein the sealing region has a first diameter
2 greater than a second diameter in the portions of the stent adjacent to the sealing region.

1 20. The stent of claim 19, wherein the first diameter in the sealing ring is
2 maintained by a plurality of filaments affixed between portions of the stent adjacent to the
3 sealing region that hold the adjacent portions in an axially compressed configuration with
4 respect to one another.

1 21. The stent of claim 1, wherein the first component and the second
2 component each further comprise a graft covering, lining, or combination thereof.

1 22. The stent of claim 13, wherein the sealing region has a ringlike
2 geometry.

1 23. The stent of claim 1, wherein the sealing region has a spherical
2 geometry.

1 24. The stent of claim 1, wherein the sloped sections have a radial strength
2 greater than the nominal diameter sections.

1 25. The stent of claim 1, wherein the sloped sections have a radial strength
2 less than or equal to the nominal diameter sections.

1 26. A braided modular stent comprising:

2 a body having two integral leg stumps depending therefrom, an end section
3 having a hexagonal cell wound architecture opposite the leg stumps, and a sealing ring
4 adjacent the end section for providing an endoleak-resistant seal between the stent and a body
5 lumen into which the stent is adapted to be installed, the sealing region having a greater
6 radial strength than a portion of the stent adjacent to the sealing region; and

7 two legs, wherein each of said stumps and each of said legs has an hourglass-
8 shaped interface for interlocking the legs to the leg stumps, each hourglass shaped interface
9 comprising a reduced diameter section positioned between two sloped sections, each sloped
10 section extending between the reduced diameter section and one of a plurality of nominal
11 diameter sections, the reduced diameter section having a greater radial strength than the
12 nominal diameter sections.

1 27. The braided modular stent of claim 26 wherein the sealing region
2 comprises one or more of:

3 (a) a first braiding angle greater than a second braiding angle in the
4 portions of the stent adjacent to the sealing region;

5 (b) a first set of metallurgical properties different than a second set of
6 metallurgical properties in the portions of the stent adjacent to the sealing region;

7 (c) a plurality of first regions of braided filaments in which the filaments
8 have a first cross-sectional area that is greater a second cross-sectional area in a plurality of
9 second regions of braided filaments in the portions of the stent adjacent to the sealing region;
10 and

11 (d) a first diameter greater than a second diameter in the portions of the
12 stent adjacent to the sealing region.

1 28. The braided modular stent of claim 26 wherein the reduced diameter
2 section of the hourglass-shaped interface comprises one or more of:

3 (a) a first braiding angle greater than a second braiding angle in the
4 nominal diameter sections;

5 (b) a first set of metallurgical properties different than a second set of
6 metallurgical properties in the nominal diameter sections; and

7 (c) a plurality of first regions of braided filaments in which the filaments
8 have a first cross-sectional area that is greater a second cross-sectional area in a plurality of
9 second regions of braided filaments in the nominal diameter sections.

1 29. The stent of claim 26 wherein the body and the legs each further
2 comprise a graft covering or lining.

1 30. A method for fabricating a braided stent comprising at least one
2 circumferential elevation, the elevation comprising a first section of the stent having a first
3 outer diameter that is greater than a second outer diameter of a second section of the stent
4 distally adjacent the elevation and a third section of the stent proximally adjacent the
5 elevation, the method comprising the steps of:

(a) braiding a plurality of filaments together to create the braided stent having a first configuration in which the second section and the third section are a first distance apart;

(b) placing at least a portion of the braided stent on a mandrel having essentially the second diameter and then repositioning the second section axially closer to the third section in an axially compressed configuration in which the first section between the second section and the third section bulges radially outward into the circumferential elevation; and

(c) heat treating the mandrel and the stent with the stent in the axially compressed configuration to permanent set the circumferential elevation.

31. The method of claim 30 comprising providing the circumferential elevation on the stent in a customized location corresponding to a specific lumen geometry of a patient into which the stent is to be implanted.

32. A method for fabricating a braided stent comprising at least one circumferential elevation, the elevation comprising a first section of the stent having a first outer diameter that is greater than a second outer diameter of a second section of the stent distally adjacent the elevation and a third section of the stent proximally adjacent the elevation, the method comprising the steps of:

(a) braiding a plurality of filaments together to create the braided stent having a tubular shape and comprising an interior and a plurality of overlapping filaments, the braided stent having a first configuration in which a plurality of first overlaps in the second section is positioned a first axial distance apart from a plurality of corresponding axially aligned second overlaps in the third section; and

11 (b) connecting each of a plurality of the first overlaps to its corresponding
12 axially-aligned second overlap on the interior of the braided tubular stent, using a filament
13 with a length less than the first distance, so that the first section between the second section
14 and the third section bulges radially outward to form the circumferential elevation.

1 33. The method of claim 32 comprising providing the circumferential
2 elevation on the stent in a customized location corresponding to a specific lumen geometry of
3 a patient into which the stent is to be implanted.

1 34. A method for fabricating a braided stent comprising at least one
2 circumferential elevation, the elevation comprising a first section of the stent having a first
3 outer diameter that is greater than a second outer diameter of a second section of the stent
4 distally adjacent the elevation and a third section of the stent proximally adjacent the
5 elevation, the method comprising the steps of:

- 6 (a) braiding a plurality of filaments together to create the braided stent;
- 7 (b) positioning an annealing mass inside of the braided stent, the annealing
8 mass comprising a geometry sufficient to produce the circumferential
9 elevation but having a length less than the length of the stent; and
- 10 (c) heat treating the stent with the annealing mass positioned inside to
11 permanent set the circumferential elevation.

1 35. The method of claim 34 comprising using an annealing mass in step (b)
2 having a spherical geometry or truncated spherical geometry.

1 36. The method of claim 34 comprising using an annealing mass in step (b)
2 having a cylindrical or ringlike geometry.

1 37. The method of claim 34 comprising using an annealing mass in step (b)
2 having a partial mandrel geometry comprising a protruding region having the geometry
3 sufficient to produce the circumferential elevation and adjacent non-protruding regions on
4 either side of the protruding region.

1 38. The method of claim 37, wherein the annealing mass has a length that
2 is less than or equal to a nominal diameter of the stent in an area of the stent in which the
3 annealing mass is placed in step (b).

1 39. The method of claim 34 comprising providing the circumferential
2 elevation on the stent in a customized location corresponding to a specific lumen geometry of
3 a patient into which the stent is to be implanted.